Number 144

AGS STUDIES REPORT

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Subject Linac Momentum Spread -- A Crude Measurement

OBSERVATIONS AND CONCLUSION

The pulse lengths of bursts of protons which occur at the beginning of the pulse train from the Linac are measured using the F20 Wall Current Monitor on succeeding turns around the AGS. The smearing out of the bunch gives a measure of the momentum spread of the protons contained within it.

Figures 1 and 2 are photos of these precursion bunches on succeeding turns. Figure 3 shows widths versus turn number estimated from these photographs at the base line and at a half height position. Points plotted as O and X come from Fig. 1, FWHM and base line width respectively. The dots are FWHM from Fig. 2.

$$\frac{\Delta\tau}{\tau} = \left(\alpha - \frac{1}{\gamma^2}\right)\frac{\Delta p}{p}$$

$$\frac{\Delta p}{p} \cong \frac{\Delta\tau}{\tau}(\gamma^2)$$

$$= \left(\frac{3 \times 10^5}{\text{sec}}\right)(\Delta\tau)$$

Using this the "eyeball" slopes in the figure imply momentum spreads of 14% at FWHM point, which includes approximately 75% of the particles and .20% at the base line.

F20 Wall Monitor

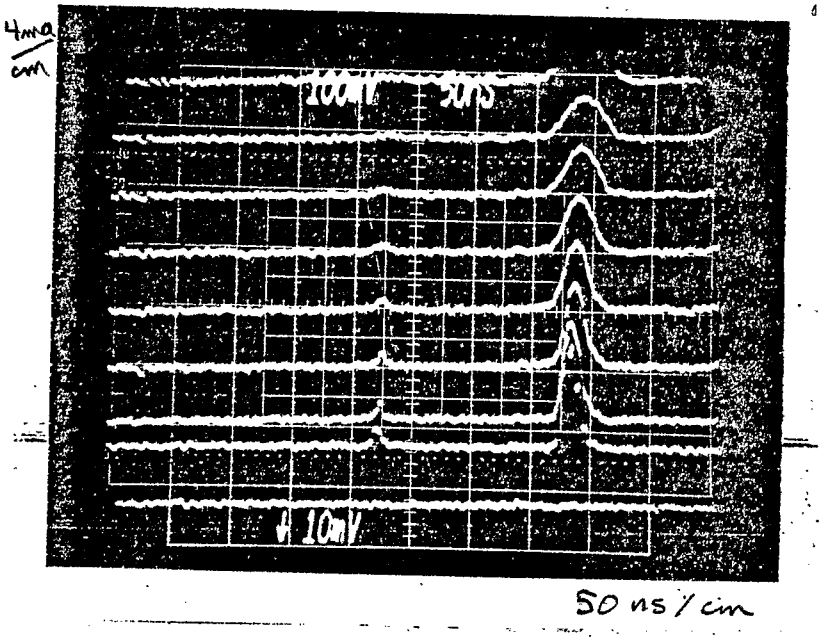

Fig. 1. Linac Pulse Precursor

The base line estimates would not be sensitive to a small high $\Delta p/p$ component--which would quickly be lost in the base line noise.

The precursor pulses are probably due to ringing associated with the discharge of the "chopper" circuit which defines the front edge of the Linac pulse.

The measurement was suggested by both G.W. Glenn and E. Raka.

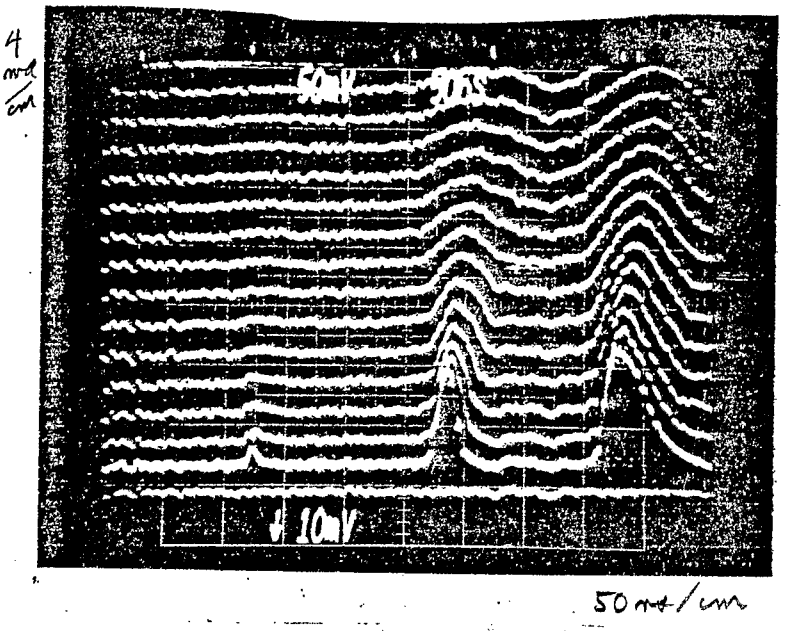

Fig. 2. Linac Pulse Precursors

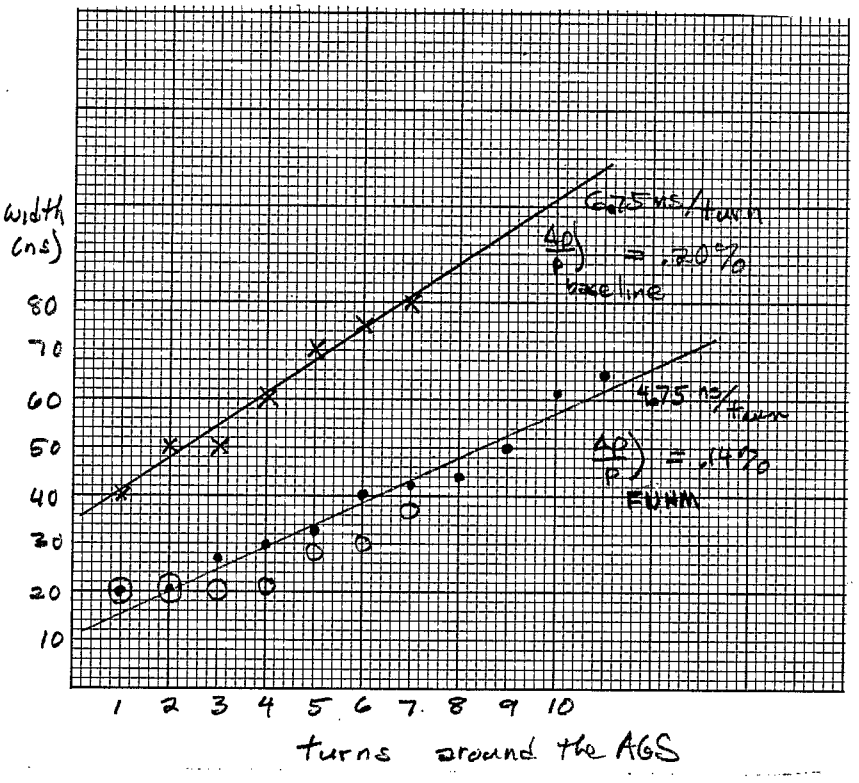

Fig. 3. Turns around the AGS